Disposal of HCN Fumigant Cylinders

At 5:05 p.m. August 24, 1978, the Region 6 Emergency Response Branch (ERB) received a call from the National Response Center (NRC) concerning two (2) 75 pound capacity liquid hydrocyanic acid (HCN) cylinders at the Jones-Haskell Grain Co-op in Stamford, Texas (approximately 40 miles north of Abilene). The report, called into NRC by Major Stringer of the U.S. Army, Washington, D.C., stated that the cylinders were leaking cyanide gas and there was an imminent danger of explosion. The NRC report also stated that the offices of Senators Tower and Benson had been contacted. A subsequent call to Mr. Lynn Caton, Manager of the Co-op, revealed that the cylinders were intact and not leaking.

Mr. Caton reported that some of his employees were cleaning a small warehouse on the grain co-op property on Wednesday, August 23, 1978, when they discovered the two cylinders. A placard on the cylinders advised contacting the manufacturer, American Cyanamid Company, for proper disposal. Mr. Caton contacted American Cyanamid and they advised him of the explosive hazard and said the would send a disposal crew to the site. The crew arrived on site early Thursday morning and began making plans for the disposal operation.

This product has been used in the past as a grain fumigant, but this practice was stopped several years ago. American Cyanamid has not produced this material in approximately twelve years. The cylinders were relatively safe for shipment and use during the first six months, but after that time they became a serious explosion hazard. All cylinders should have been returned to the producer within 90 days of their original shipment date.

American Cyanamid reports that there are between 100 and 150 of these cylinders still unaccounted for. Their records show the original distribution, but many were sent to jobbers and their records on distribution have either been destroyed or lost or no records kept on distribution. American Cyanamid thinks most of these cylinders were delivered to grain companies in Texas, Oklahoma, and Kansas; however, some of the product may have been used for other purposes.

The normal procedure for disposal of these cylinders is to dig a six-foot-deep pit as near as possible to where the cylinders are located, move the cylinders into the pit, place explosive charges on them, and explode them in the pit. Additionally, gasoline and/or diesel fuel is placed in the pit and ignited at the time the explosion occurs. The flame burns the cyanide gas and converts it to carbon dioxide (CO_2), water (H_2O), and nitrogen (N). American Cyanamid has used this procedure in five previous incidents and reports complete combustion of the HCN.

In another incident the cylinder exploded while American Cyanamid personnel were trying to purge the HCN from the cylinder for burning in a tub. Prior to the explosion the chemical reaction inside the cylinder generated enough heat to cause the outside to become hot and start peeling the paint. When this was noticed the personnel in the area sought safety and the cylinder exploded about 90 seconds later. Based on this experience, American Cyanamid believes the cylinders become extremely dangerous as soon as they are moved for there is no way to halt the chemical reaction that is set up inside the cylinders and enough pressure is built up to cause the cylinders to explode.

This information was related to the Jones-Haskell Grain Co-op and the city officials of Stamford. The cylinders were at least 12 years old and created an explosion hazard in their present location but the explosion hazard would be much greater if the cylinders were moved.

The grain company is situated on approximately 1/2 city block and about 1 city block south of the main business district. There are some residences and businesses across the street to the south and west. There are several metal grain silos, 64 feet high, located on the north side of the property and lined up in an east-west direction. The warehouse is a small wood frame corrigated sheet metal building in the southwest corner of the property.

American Cyanamid recommended digging a six-foot-deep pit about 25 feet northeast of the warehouse, between the warehouse and the grain silos, and exploding the cylinders in the pit. A fire would be started to burn the HCN gas.

The Co-op contacted local Civil Defense personnel and a contractor in the area to try to obtain an explosive expert, but were unsuccessful. They next contacted the Emergency Ordinance Detachment (EOD) at Fort Hood, Texas. Fort Hood contacted the 546th EODC at Fort Sam Houston, Texas, and they in turn contacted EPA, Emergency Response Branch (ERB) for concurrence. After checking with EPA Headquarters, and the Region 6 Regional Administrator's office, EPA notified the Army that in their opinion this was the best method to dispose of the HCN, both from a toxic gas and explosion hazard standpoint. The Army then dispatched two explosive experts to the site on Friday morning and two ERB representatives arrived on scene at 1 p.m. Friday.

Upon arrival in Stamford, it was learned that the city officials had not given their consent for the proposed operation. They wanted to move the cylinders outside the city limits some 2 or 3 miles for detonation. The American Cyanamid personnel on scene re-emphasized that this would be a greater hazard to life and property than the proposed method of detonating the cylinders in a pit on the Co-op property. The city officials went into a meeting at the city hall and no firm commitment was made until about 6:30 p.m.

Mr. John Regula with OSHA in Ft. Worth arrived on-scene about 3 p.m. Friday. After reviewing the procedure, he concurred with the proposal to detonate the cylinders in a pit on the Co-op property.

American Cyanamid representatives proposed that an area within a 250 foot radius of the pit be evacuated while EPA recommended at least a 750 foot radius and Army personnel agreed with EPA. The Army explosive experts later recommended a 2500 foot radius for evacuation and this recommendation was followed. Upon receiving the final approval to carry out the proposed plan, Stamford police, Jones County Sheriff's Department, and Texas Department of Public Safety representatives started evacuating a 2500 foot radius around the blast site. At approximately 9:30 p.m. Friday the city police reported the area evacuated. All coordinating personnel at the Co-op evacuated to a site about 1 1/2 blocks away where there was a clear view of the pit area. The two Army EOD representatives and four American Cyanamid employees began the final phase of moving the cylinders to the pit and placing the charges. Two 1 1/4 pound strips of C4 explosive were placed on each cylinder and detonators were placed in the gasoline and diesel fuel. The time-clock detonator was set for four minutes and all personnel evacuated the area. The first explosion occurred at approximately 10:10 p.m. A fire was started in the pit which continued to burn for about two hours. American Cyanamid and Army personnel did not think the cylinders ruptured with the first explosion. Approximately 10 minutes later a large explosion occurred followed by another in an additional 5 minutes. The explosive charges did not rupture the cylinders as planned and heat and chemical reaction caused the two large explosions due to pressure buildup within the cylinders. With both of these large explosions a cloud of smoke was sent about 100 feet into the air and it dispersed quickly. There was a 10 mph breeze from the southeast which assisted dispersion.

The area was checked for cyanide vapors about 20 minutes after the last explosion and found to be clear. The all clear was sounded about 12:15 a.m. Saturday and citizens were allowed to return to their homes. The Co-op property was kept sealed off throughout the night in the event any plastic explosive fragments might have been blown out onto the ground. A search was conducted Saturday morning and results were negative.

There were no reported injuries caused by the explosion and the unburned cyanide gas, if any existed, was all dispersed rapidly. Damage from concussion was confined for the most part to glass breakage. Within a one-block radius windows were broken in several business and residences. A bank window 1 1/2 blocks away was broken and a large plate glass store window two blocks away was cracked. A rock house just across the street, south of the pit, had window frames blown out and an existing crack was widened. This house appeared to be some 40 years old. The valve and cover assembly from one cylinder was

blown into the air and struck one of the metal grain silos at a point 56 feet above ground level. The impact dented the silo and ruptured a metal joint. City officials and the manager of Jones-Haskell Grain Co-op did not want to assume any responsibility for damages caused by the explosion.

This situation was an excellent example of the mass confusion that can develop in an emergency situation where no person or agency is in charge. The final decision was left to the city officials who undoubtedly felt incapable of coordinating the operation. The decision to approve an action that could damage property and endanger lives was one they did not wish to make. Future incidents could be handled in a much more efficient manner if a Federal or State agency representative had authority to coordinate the operation. City officials and industry representatives would gladly cooperate with this authority and the local officials would feel more comfortable.

As a result of the Stamford, Texas experience, the Region 6 ERB and personnel from American Cyanamid Company developed a plan to dispose of HCN fumigant cylinders to avoid explosions such as had occurred in Stamford.

Subsequent to the Stamford incident, ERB personnel contacted Jet Research Center, Inc., of Arlington, Texas, to determine if oil well jet perforating equipment could be adaped to put holes in the HCN cylinders to release the gas immediately so it could be burned quickly and without explosion. A meeting of Emergency Response Branch, American Cyanamid Company, and Jet Research Center personnel was held in October 1978 at the EPA Region 6 office to plan the project.

Following the meeting, Jet Research Center fabricated shaped charges that can instantly cut large windows in the cylinders. They organized three, three-man teams to respond and do a turnkey disposal job under the supervision of American Cyanamid and EPA. In December 1978, EPA, American Cyanamid Company, and Jet Research Center personnel underwent a 2-day testing and training program at the American Cyanamid plant in New Orleans and the Louisiana State Prison at Angola, Louisiana.

The plan for disposing of cylinders found in the future is as follows: EPA will coordinate the entire operation on scene and will handle coordination with State and local authorities for safety, evacuation, etc. Jet Research Center will determine where and how to dispose of the cylinders and will handle the actual removal and detonation of the cylinders. American Cyanamid Company will have a technical advisor on scene and will pay all costs of the disposal operations if the cylinders are determined to be their products. American

Cyanamid requested that EPA Region 6 coordinate any events occurring outside Region 6. We have agreed to call the appropriate OHM coordinator of the EPA Region involved and advise him of the procedures and be available for any other assistance we can provide.

On January 8, 1979, American Cyanamid began sending out 400 letters to old customers and they are following up with phone calls in an attempt to locate the missing cylinders.

Farmer's Corner Incident

At approximately 4:00 p.m. Monday, January 15, 1979, Mr. David Butterfield of American Cyanamid called Wallace Cooper and reported that another 75 pound HCN cylinder had been found at Farmer's Corner, 1.2 miles outside the city limit of Lubbock, Texas. The newly formulated disposal plan immediately was put into effect. American Cyanamid had notified Jet Research Center and requested a disposal team. Cooper called the Texas Air Control Board (TACB) district office and the Texas Department of Public Safety (DPS) Regional Emergency Coordinator, both in Lubbock, and advised them of the incident, its potential dangers, and the plan for disposal. Cooper then departed for Lubbock on the same commercial flight with two Jet Research Center representatives and Mr. A. C. Buckland, American Cyanamid technical representative from New Orleans.

The team arrived in Lubbock at approximately 11:00 p.m. and was met by Mr. Dan Young, owner of Farmer's Corner. Mr. Young immediately took us to the site where the HCN cylinder was located so we could begin formulating our plans for disposal. The cylinder was located in a metal building approximately 24 feet square which housed the controls for a set of platform scales located just outside. Adjacent to the back side of the building was a 2,000 gallon buried diesel tank with an electric pump on the surface. The back of this building was about 240 feet from the fence on the back (south) property line.

A large horizontal ammonia storage tank was situated about 75 feet from the back property line and the area south of the fence was cultivated farm land with no buildings for 1/2 mile in that direction. The ammonia storage tank was emptied into portable tanks and they were moved a safe distance from the area. Also, a gasoline and diesel fuel transport truck was moved out of the area. Farmer's Corner is located on U.S. Highway 84 with commerical establishments on both sides of the highway. There were no residences in the immediate area.

It was decided to dig a pit near the back fence and move the cylinder into the pit, cut both ends off, and burn the HCN. Due to the fact the distance from the door of the building to the pit was 285 feet, it was decided to dig an alternate pit between the building and ammonia storage tank to be used in the event the cylinder started heating up and it became necessary to detonate it as soon as possible to avoid a large explosion.

Mr. John Warner, District Supervisor of the TACB and Mr. Schlueter, Emergency Coordinator, Captain Wilson and Lt. Strain of the DPS arrived on scene at 8:30 a.m. Tuesday, January 16, 1979. The situation was explained to them and our proposed method of disposal was explained. They had no objections. A request was made for the DPS to handle notification of neighboring businessess and evacuation and blocking of Highway 84 during the actual moving, detonation, and burning. They agreed to handle these actions.

The two pits were dug with a backhoe and a tractor with a blade was used to smooth a path from the building to the primary pit. The smooth path passed adjacent to the alternate pit.

The plan called for three JRC personnel to enter the building, place the cutting charges on the top and bottom of the cylinder, affix a hoisting clamp near the top, and load the cylinder on a rubber-tired dolly for transporting to the pit. The detonating line was attached to one man's belt and pulled along as they moved the cylinder so it could be connected and the charges detonated before reaching the primary pit if necessary. One man continually monitored the outside temperature of the cylinder by moving his hands along the surface of the cylinder.

A tripod and hoist were erected at the primary pit to lift the cylinder from the dolly and lower it into the pit. Both pits contained scrap wood and a mixture of gasoline and diesel fuel and a detonator to start the fire. If it had been necessary to use the alternate pit, the cylinder would have been walked down an incline and left on the dolly. The detonating line would have been attached and the charges detonated as soon as the men cleared.

As there were several operations to be performed and coordinated, it was decided to conduct two (2) practice runs using an empty cylinder of the same dimensions. The DPS and TACB personnel witnessed the practice runs so they would know the exact procedure. The DPS furnished the EPA On-Scene Coordinator a Walkie Talkie radio that was on the same frequency as their patrol cars. An ambulance was placed on standby at the DPS road block about 1/4 mile away.

At 10:00 a.m. the DPS personnel visited each business in the area and briefed them on the possible hazard. They were told that a DPS patrol car would drive down the highway with his siren on as the warning signal and 10 minutes would be allowed after that for evacuation. The siren warning was given at 11:00 a.m. and the road blocks were closed at 11:09 a.m. The JRC crew entered the building at 11:10 a.m. and began placing the charges on the cylinder. At 11:30 a.m. the cylinder was ready in the pit and the charges were detonated.

The cutting charges ignited the gasoline and diesel fuel in the pit. It was planned to cut the ends off the cylinder first and have a man go up to the pit wearing an air pac and assure that this was successful prior to starting the fire. However, due to the additional weight of the full cylinder, the pile of scrap lumber shifted and one of the charges was directly above the gasoline and diesel fuel.

The man with the air pac hurried to the pit and confirmed that the ends had been removed from the cylinder and the explosion hazard was passed. The fire was allowed to burn 10 minutes to assure combustion of the HCN. At 11:40 a.m. the all clear signal was transmitted by the EPA OSC to the DPS. The highway was opened to traffic and a partrol car again drove down the highway with a siren sounding as the all clear signal and people returned to their businesses.

There were only seven (7) people in the blast area during the critical 30 minutes - three (3) JRC men handling the cylinder and monitoring its temperature, one (1) JRC man wearing an air pac and ready for any rescue operation, one (1) JRC man standing by the firing controls, one (1) American Cyanamid technical representative, Mr. A. C. Buckland, and one (1) EPA representative, Mr. Wallace Cooper, serving as On-Scene Coordinator and handling communications with the DPS. The DPS furnished eight (8) partolmen under the supervision of Sgt. Hyatt and their Emergency Coordinator, and the Lubbock County Sheriff's Department furnished two (2) deputies for the operation.

The whole operation was very successful. There were no injuries and no property damage. Everyone involved in the operation knew what others were doing and what to expect. This is a good example of what can be accomplished with industry and government working together to solve a potentially dangerous problem.